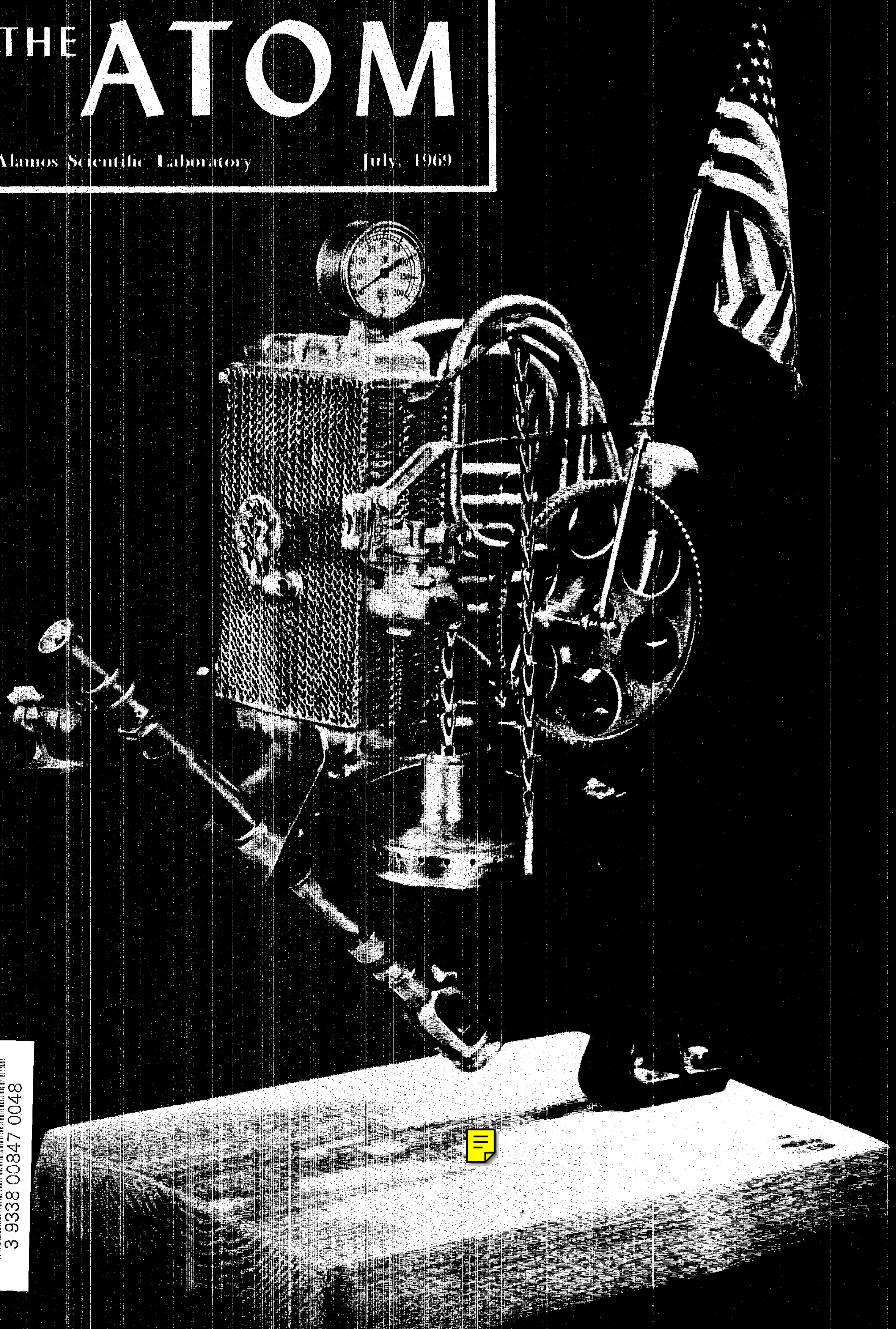
THE ATOM

Los Alamos Scientific Laboratory July, 1969



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THE ATOM

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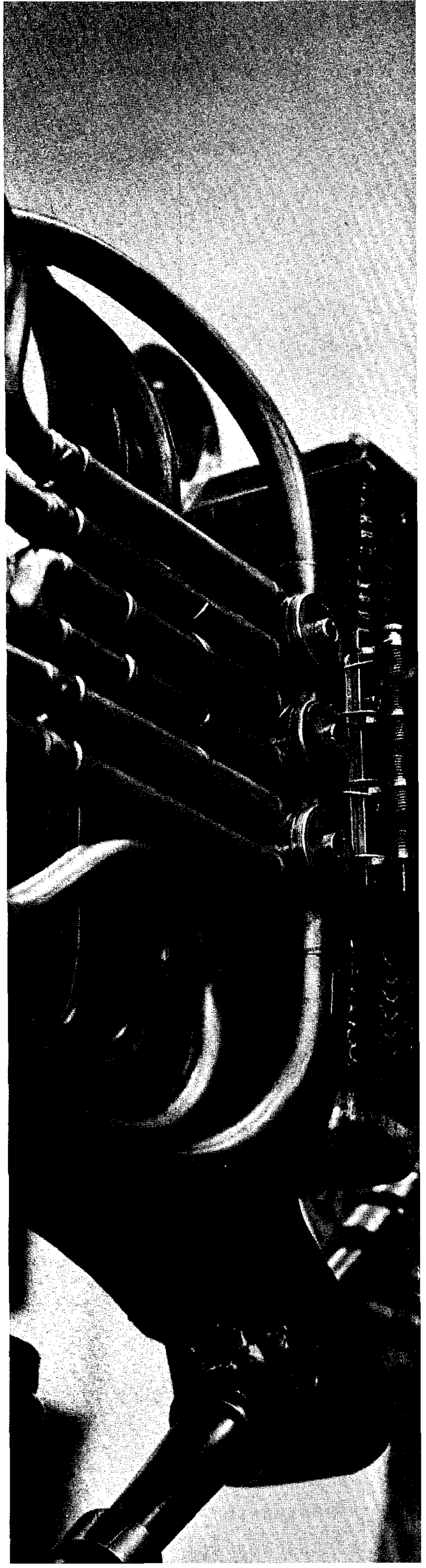
COVER:

Our cover photo is a representation of an underground nuclear explosion. Although some imagination is required to visualize how this could be, the story beginning on page one will be of some help.



Bob Brownlee, J-DOT, studies the assemblage characterizing an underground nuclear explosion which was made by his Kansas cousin, Donald Brownlee.

A Kansas farmer who majored in physics gives his impression of what an underground nuclear explosion looks like through a brass assemblage he calls the "atom-miser"

By Ken Johnson

When the right word fails them, people often describe something by using slangy terms such as giz-wiz, what-cha-ma-callum and thing-a-ma-bob. According to Webster, something of this type is a contraption, contrivance or gadget. To those in the field of art, it is an assemblage.

Whatever it is, Bob Brownlee, J-DOT, has it.

It's a conglomerate of parts, mostly antique and brass, united by welds, solder, pins and bolts, symbolizing an underground nuclear explosion.

Its makeup includes the hame of a draft-horse harness, a gear from a cream separator, a part from a water pump, a hose nozzle, a lever-action water faucet, a jet from an auto gas-

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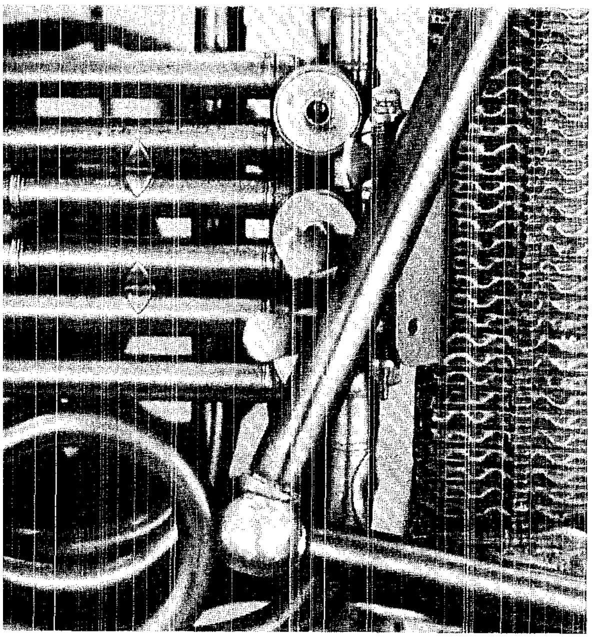
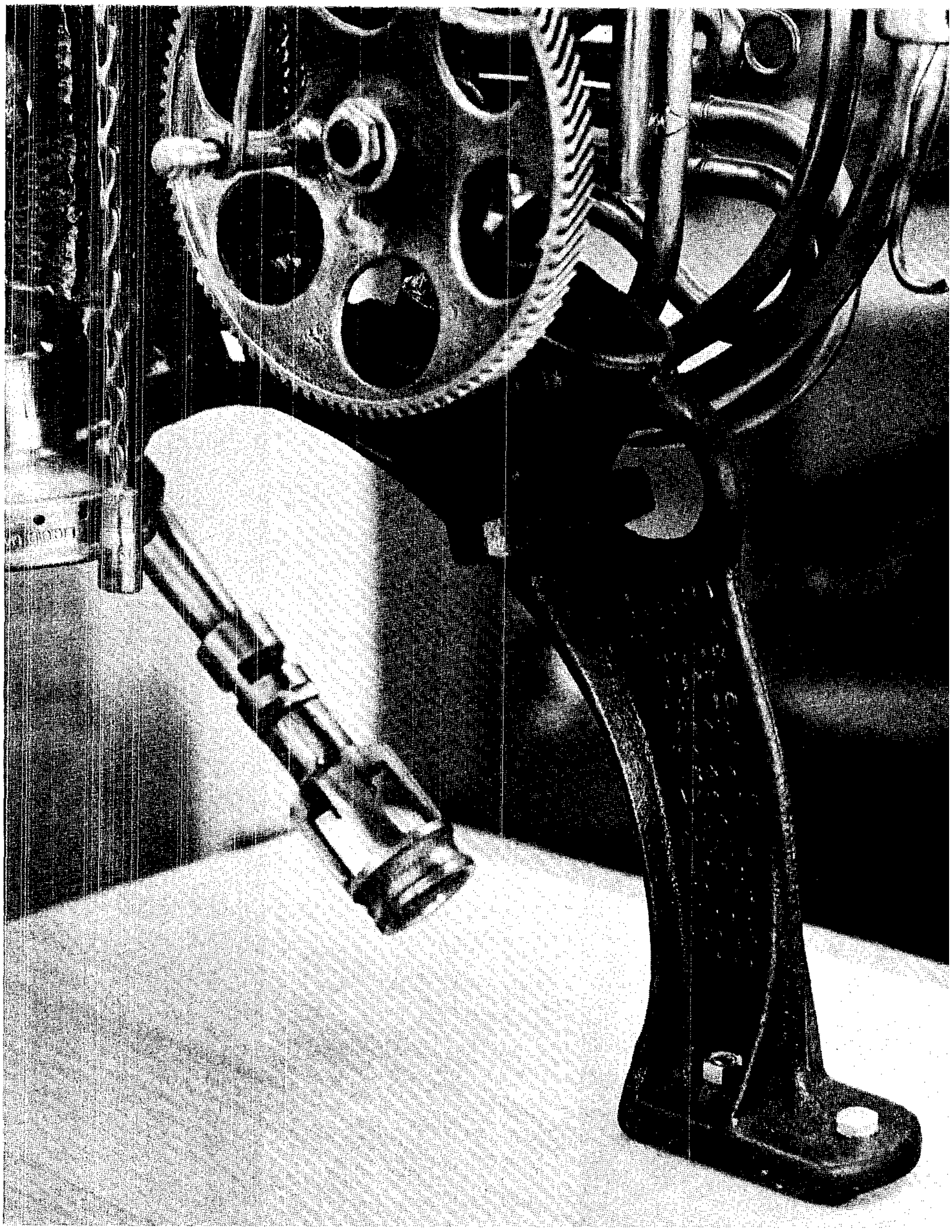


The arm that holds the spoon opens and closes the valves on the French horn.



A part from a corn planter holds the assemblage in an upright position. The most recent patent date on the part is 1902.

. . . the "atom-miser"

Continued from page 1

lamp, a spoon, the core of a car heater, a pressure gauge, the tubing of a French horn including valves, the American flag, a bell, and a part of a corn planter.

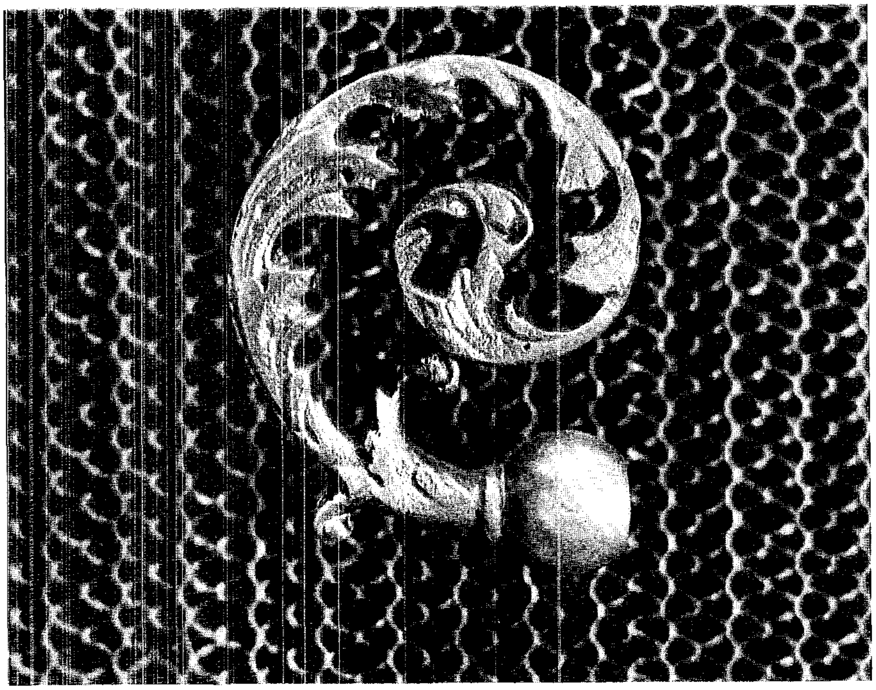
Brownlee is sentimentally attached to the assemblage because of his association with underground nuclear testing and because one of its parts is a direct descendant of his family's history. This is the part from a corn planter which is bolted to an oak-wood base and holds the assemblage in an upright position. The corn planter was his grandfather's. An uncle told Brownlee that the planter was in use about 1910. The most recent patent date on the cast-iron piece is 1902.

With the exception of this part, the flag, the spoon and the dial and crystal of the pressure gauge, everything is made of brass. All of the parts have meaning if only that the maker of the assemblage likes to work with brass.

In regard to underground nuclear explosions, the half-moon-shaped part from the corn planter represents the underground cavity where the nuclear device is placed; the hose nozzle, joined to the part from a water pump by a brass tube, is the line-of-sight pipe from ground level to the cavity far below. The gas jet and pressure gauge represent the gasses expelled from a nuclear explosion; the heater core symbolizes its heat; the spoon is for sampling its products and the French horn tubing represents the sampling-pipes through which these products are channeled. The American flag represents the taxpayer who supports nuclear research.

By turning the cream-separator gear, the flag waves, the bell rings, the French horn valves open and close and the spoon moves up and down and back and fourth as if it is digging.

The assemblage was a gift from a first cousin. Brownlee had given him an unclassified explanation of underground testing a few months ago. From memory Cousin Donald J. Brownlee, a Sylvia, Kan. farmer who majored in physics, built it.



The ornate, brass jet from an auto gas-lamp lies across the mesh pattern of the core from a car heater. The jet represents gases expelled from the explosion and the heater core, heat from the burst.

Sculpturing, wood carving and making assemblages is a hobby of the Kansas farmer. Although much in demand in the Sylvia area, none of his creations are for sale. He does, however, allow them to be exhibited in business places and occasionally gives them away.

Friends and neighbors have furnished many antique and brass items that go into his assemblages.

"I went to Kansas to see my daughter graduate from college recently," Bob Brownlee said. "While there, I received a message from him (Donald), asking me to drop by his house. I did and he gave me this."

Bob has grown quite fond of the gift. He plans to take it with him to the Nevada Test Site in the near future to show to others whose work is associated with underground testing.

Its maker called the assemblage the "Atom-Miser." Bob's J-DOT companion Lee Aamodt, however, has suggested that it is a close representation of Project Rulison, a Plowshare experiment tentatively scheduled for Western Colorado in September, and could be named "Industrial Application of Nuclear Energy (INANE)."

Vela Satellites 9 and 10

Flight path of a Titan III-C launch vehicle is visible from ignition to an altitude of about 25,000 feet where its speed was 1,500 miles per hour. Lights of Cocoa Beach are in foreground. The Atlantic Ocean is at right and the lights from Cape Kennedy are in right foreground. (Photo by Martin Marietta Corporation of Denver)

another pair of eyes in the sky

By Bill Richmond

Sixty thousand nautical miles from earth—in the near-vacuum of space—are several orbiting satellites tabbed "Eyes in the Sky."

Their number was increased by two last month.

These eyes are part of Project Vela, a program initially started to detect clandestine nuclear weapons testing. They also contain instruments which furnish scientists with more data on the sun and space physics.

Much of the credit for the success of the satellites known as Vela ("vigil" in Spanish) belongs to two scientific research laboratories in New Mexico—the Los Alamos Scientific Laboratory and Sandia Laboratory in Albuquerque. Both have contributed greatly to the design and development of instrumentation for the satellites since Launch I in October of 1963.

Project Vela was an outgrowth of the Geneva Nuclear Test Ban negotiations between the United States, the Soviet Union and Great Britain in 1958-60. The program was conceived to provide the U.S. with a means of determining if nations were adhering to the moratorium on nuclear testing.

The limited Test Ban Treaty was signed on August 5, 1963, and on October 16 of that year the first pair of Vela Satellites was launched. Since then, other launches of the satellites—in pairs—have occurred in 1964, 1965, 1967 and again last month.

Velas 9 and 10 of Launch V have 18 types of instrument assemblies with more than 100 sensors, according to Jim Coon, P-4 group leader. P-4 is LASL's space physics group and the group most directly concerned with the Vela Satellite project.

LASL's responsibility lies primarily in the area of designing and developing instrumentation for the measurement of radiation, and in

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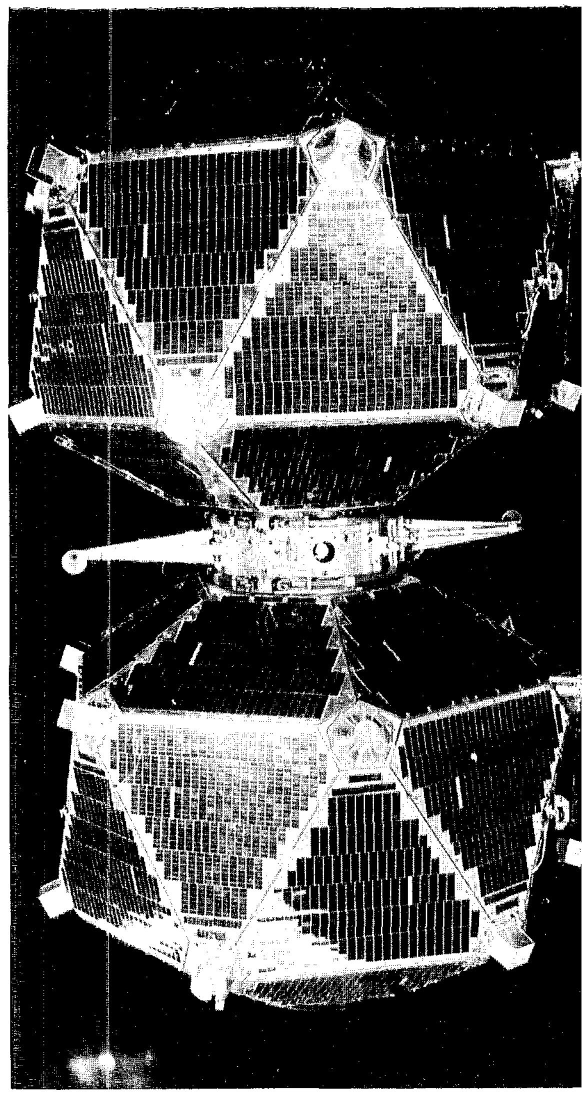
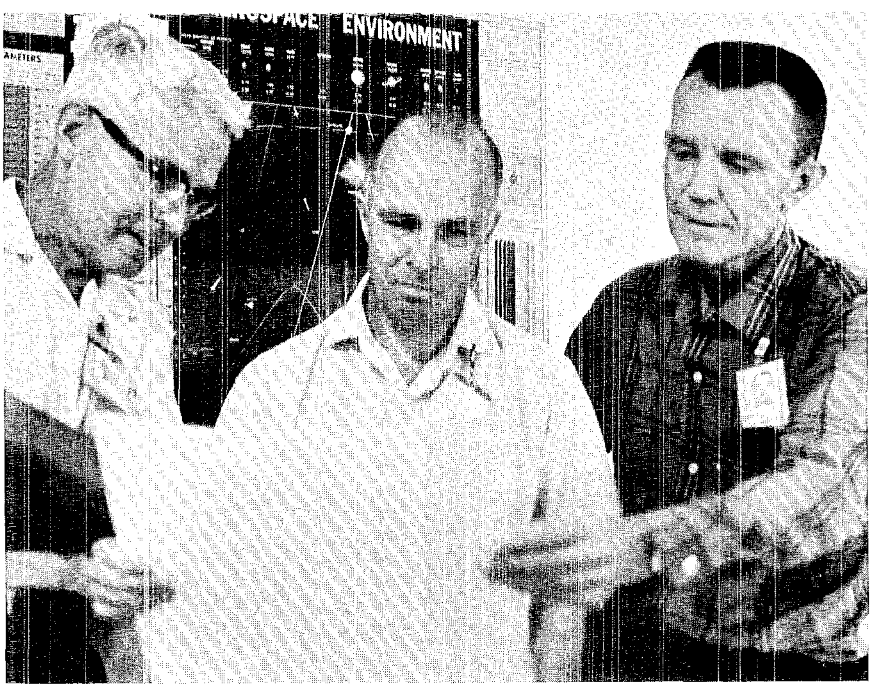
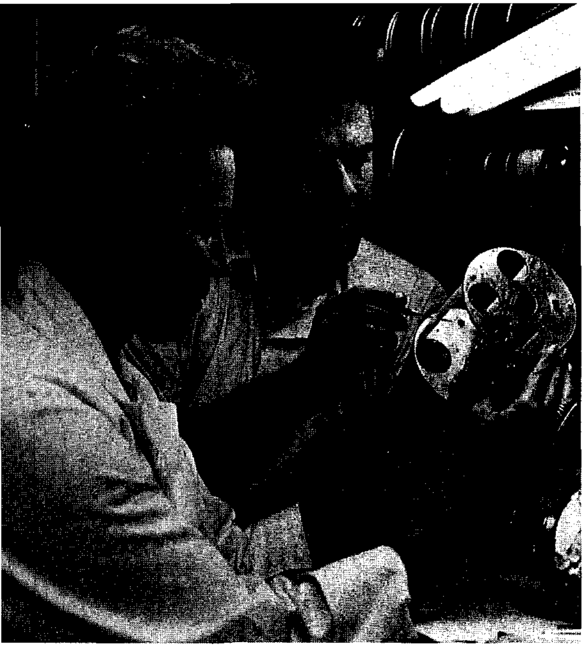


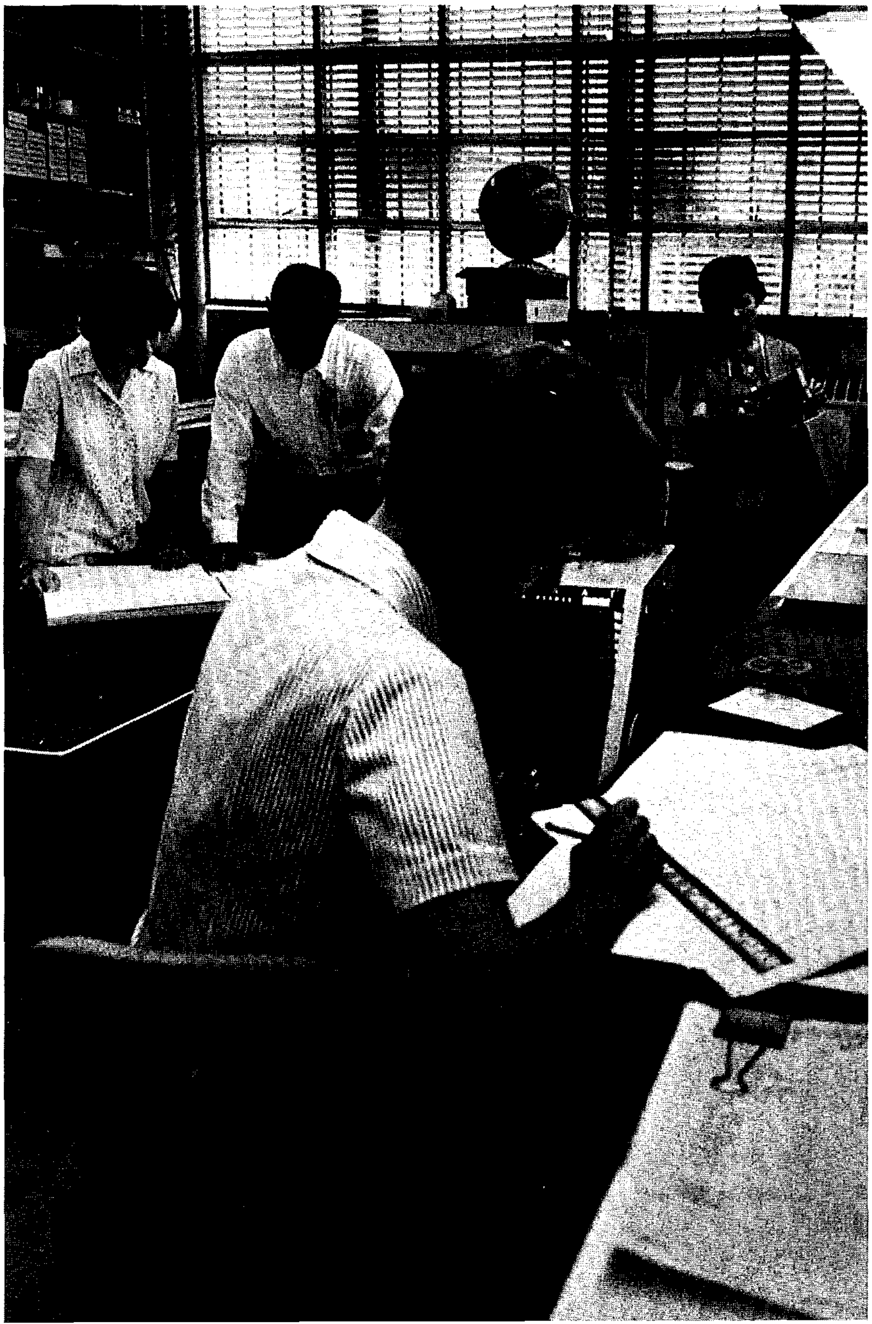
The Vela Satellites are built by TRW Space Systems in California. They are about four feet in diameter and contain 12 detector points plus 24 solar panels.



Looking at Vela data with P-4 Group Leader Jim Coon, right, are Harold Argo, alternate group leader, and Sam Bame, senior staff member.



Examining the electronics package, at left, in which solar x-ray detectors are mounted are Georgia Clark, P-1 Space Electronics section and Paul Glore, section leader. At right, Roy Olson and Walter R. Gould, both of P-4, work on an x-ray detector which is included in the Vela instrumentation. Analyzing Vela data, below, is the job of the P-4 Data Analysis section headed by Earl Tech. In foreground is Jean Dabney. In background are Winoka Miller, Tech, and Mary Catherine Warren.



Vela Satellites . . .

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the analysis of data transmitted back to earth from the satellites. Sandia is charged with the electronic logics system (an on-board computer complex) plus optical instruments and electromagnetic pulse (EMP) instrumentation.

X rays, gamma rays and neutrons are released in a nuclear explosion. The LASL instruments can detect these radiations in space bursts, i.e., above the atmosphere. Vela instruments also can observe the fireball radiation for atmospheric—which includes ground level—nuclear explosions. In the latter case, the Sandia optical instrumentation packages plus EMP measuring instruments are the keys to detection.

LASL also has instruments designed to look at solar and other natural radiation of various kinds such as solar wind, solar x rays, solar flare particles, and cosmic ray sources. This data assists in a better understanding of the sun and the interplanetary plasma. The temperatures deep in the sun's corona can be determined by looking at characteristics of ions deep in the solar wind.

Although interplanetary space is nearly a vacuum, it is now known to be filled by a plasma—a thin, electrically neutral cloud of electrons and ionized atoms. This plasma comes from the outer layers of the sun and flows outward through the interplanetary region at speeds averaging about one million miles per hour. The continuous outward flow of atomic particles from the sun is called the solar wind.

Because of the high temperatures on the sun, the nuclei and electrons of the particles are separated. Therefore the solar wind is composed of negative electrons and positive ions.

Measurements made with instruments on the Vela Satellites since the launch of the first Velas six years ago, have given a clearer picture of the solar wind properties. At the distance of the earth from the sun the normal density of ionized atoms is only five atoms per cubic centimeter, compared with about 10 billion billion particles per cubic centimeter in the atmosphere of the earth.

The solar wind acts very much like an ordinary gas in transmitting signals through interplanetary space. Following solar flares (large disturbances on the sun), the Vela Satellites have observed shock waves—similar to the sonic booms produced by high speed aircraft—moving out from the sun. On passing the earth these waves cause sudden changes in the earth's magnetic field.

This gas or fluid-like behavior of the plasma has been something of a mystery. Because of the low particle density, collisions between the atoms are much too infrequent to maintain fluid properties. However, observations by the Vela Satellites have furnished a key to this puzzle.

These observations show that the protons moving in the direction of the interplanetary magnetic field are twice as hot as the protons moving at right angles to this field. Such a situation is unstable and the particles in the plasma spontaneously begin to oscillate and produce irregular waves in the otherwise uniform magnetic field. Particles can then bounce off these waves just as they can off another particle. These "wave-particle" collisions play the same role as the "particle-particle" collisions in ordinary gas, and keep the plasma behaving like an ordinary fluid.

Because the wind is about a billion billion times thinner than the earth's atmosphere, solar wind particles are difficult to detect.

Until the analysis of data obtained from the Vela Satellites, the only positive ions that had been discovered in the solar wind were singly charged hydrogen ions, and doubly charged helium-4 ions.

Information obtained from the Velas, however, shows that there are also singly charged ions of helium-4, doubly charged ions of the rare isotope helium-3, and ions of oxygen with positive charges of five, six, and seven. There are also indications that other heavy ions are present.

Vela measurements show that the ratio of helium to oxygen is more variable in the solar wind than in cosmic rays from the sun. This implies that the solar wind and solar cosmic rays originate in different parts of the solar atmosphere. These satellites have obtained the best measurements of the helium content of the solar wind which is about 5 per cent. The wind is composed mainly of oxygen.

"Solar wind activity can cause aurora displays, problems with radio communications, and affect the earth's weather," Coon noted. "So if we could predict their occurrence, it may eventually help develop better methods of predicting weather on the earth."

Another kind of solar activity which scientists would like to be able to predict—and which has a direct bearing on future space travel—is solar particle flares.

"Solar particle flares, producing intense beams of high-energy particles are relatively rare, only about five or 10 per year, depending on the 11-year solar cycle," Coon said. "These particles can cause radical disturbances," he added.

"They tend to funnel down into aurora regions and may trigger

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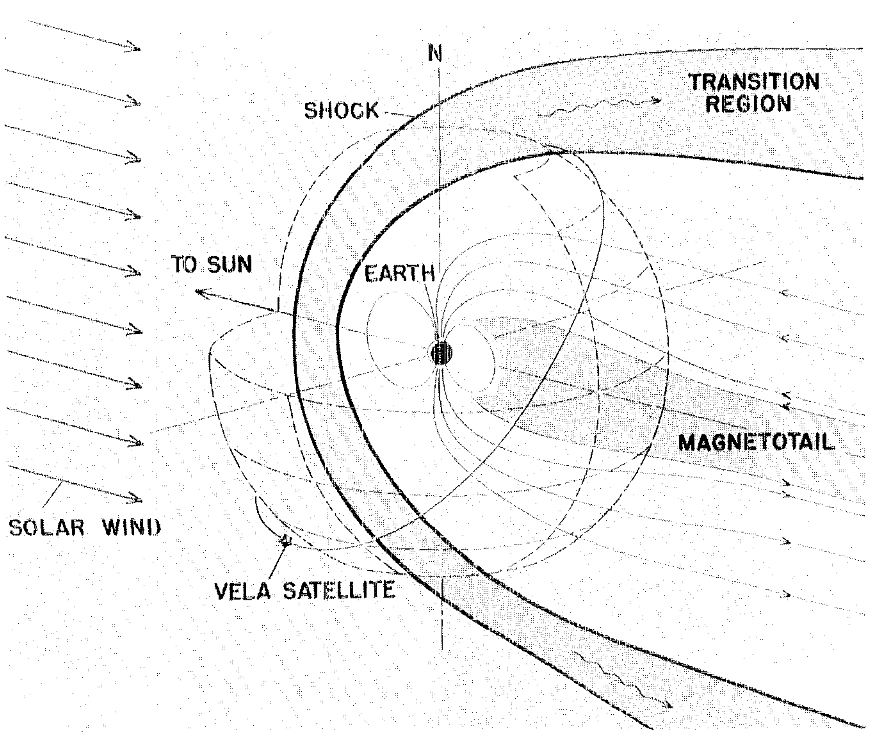
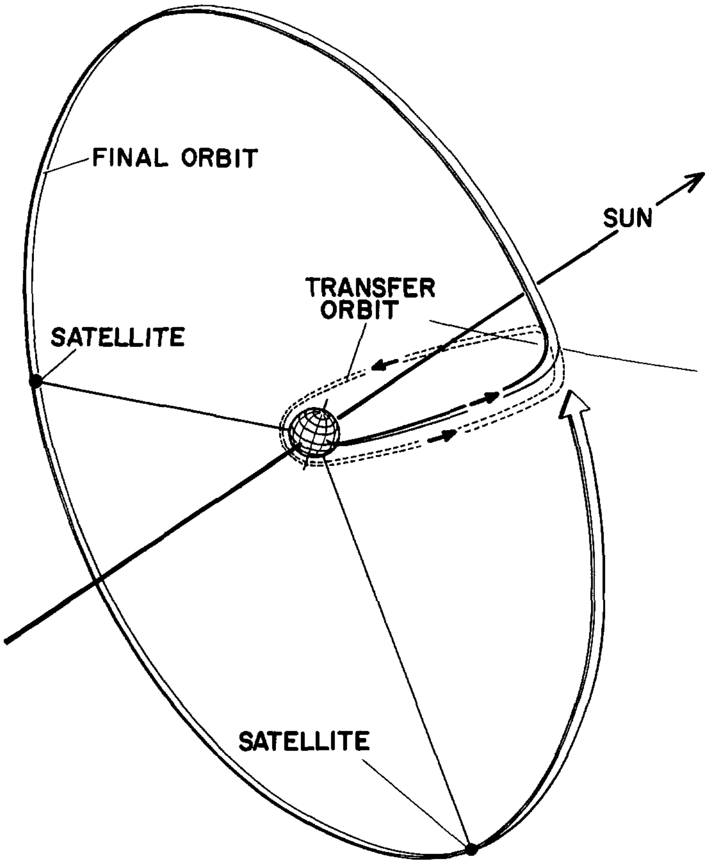
The solar wind sweeps past the earth's magnetic field. Vela Satellites, with LASL instruments, discovered its configuration.





Vela Satellites are placed in orbit one at a time even though they are launched in pairs. One is placed in final orbit while the other makes an elliptical (transfer) orbit around the earth. This allows placement of two satellites on opposite sides of the same circular orbit.

Vela Satellites . . .

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aurora disturbances. Also, these particles are a major threat to man's space missions, because of the danger of serious radiation exposure during a space walk or a walk on the moon. At present this type of flare on the sun is not predictable, although in some cases the arrival of the particles near earth can be predicted perhaps 10 minutes to an hour in advance. This comes about because the type of flare from which these particles originate usually has recognizable characteristics which can be seen by solar observatories; following the flare it takes 10 minutes to an hour for the high energy particles to transverse the distance from the sun to the earth. This is as much warning as can be given at the present time, and even this is not guaranteed. If we provide a more complete and accurate description of the nature of this radiation which can then be correlated with observations made by solar laboratories, it may be possible to develop methods of predicting the occurrence of the flare on the sun and thus provide more advanced warning so that an astronaut will have adequate time to take cover inside his spaceship."

There are instruments aboard the Velas to look at this type of radiation.

In addition to P-4, under Coon and Harold Argo, alternate group leader, others involved in the Vela program at LASL include: P-1, Space Electronics section under Paul Glore; and W-7, under Group Leader Bill Chambers, which designed and developed instrumentation for solar x rays and other radiations.

The Vela Satellites are approximately four feet in diameter and consist of 12 instrumentation—or detector—points plus 24 solar panels. The panels provide the energy source of about 100 watts to power the Vela instruments and other spacecraft electrical systems. A number of other detectors and instruments, including a transmitter to transmit data to earth and a receiver to receive commands from earth, are contained inside the satellite.

Also inside the satellite are storage batteries to hold the power for use in providing a stable source of electrical power during daylight hours and on those rare occasions when the satellite is on the dark side of the earth.

Velas 9 and 10 were launched last month aboard a Titan III-C rocket. The two satellites were mounted in tandem inside a breakaway nose cone atop the Titan rocket, which carried them to a height of about 60,000 nautical miles (about 70,000 statute miles). The nose cone fell away and the two satellites were separated from each other about a third of the way to the moon.

At that point the injection motor in one of them fired and sent the satellite into a circular orbit. The second Vela was allowed to make a natural elliptical orbit that swung it around the earth, about 10,000 miles out, and then returned it to the original apogee.

When it reached this point again, its injection motor fired and the second space watchdog also entered a circular orbit. The first Vela had by this time traveled to a point nearly 180 degrees—or 120,000 miles—from the other. Thus, the two satellites are on opposite sides of the same circular orbit.

Tracking stations located at various places around the earth's surface pick up the data transmitted from the satellites. Later, it is analyzed and interpreted in order to obtain all bits of information that may contribute to man's better understanding of the mysteries of space.

Glasstone Plans Move to Oak Ridge

Samuel Glasstone, noted science author and lecturer at the Los Alamos Scientific Laboratory, will move to Tennessee in mid-September where he will continue to work under contract for the Atomic Energy Commission at Oak Ridge.

Glasstone recently remarried and is moving to Oak Ridge to be with his wife Kathleen. She is the widow of the late William H. Sullivan who was employed at the Oak Ridge National Laboratory and was a close friend of Glasstone's.

Glasstone has been an AEC consultant and contractor for 20 years. After writing his "Sourcebook on Atomic Energy," he came to Los Alamos for a few months in 1949 in connection with the preparation of his book, "The Effects of Atomic Weapons," one of more than 30 he has authored to date. He returned to LASL again in 1951 and has been here ever since. In addition to his work for the AEC, Glasstone was, for many years, a consultant to the Laboratory.

The scientist taught the first courses offered at the Los Alamos Graduate Center on "Reactor Technology" in 1952-53. They were well received and eventually led to the famous Glasstone lectures on "The Fundamentals of Nuclear Energy."

The lectures are unclassified and are given in seven two-hour sessions. They are supplemented by eight hours of classified lectures. "The Fundamentals of Nuclear Energy" series has been offered twice annually by Glasstone since 1953. It has been considered to be the "main course" of the Laboratory's General Orientation Program for new employees. "I have agreed to come back toward the end of October or in early November to give the unclassified lectures on 'The Fundamental of Nuclear Energy,'" he said. After this fall these lectures will be entrusted to someone else and responsibility for the classified supplement will be distributed among the divisions of the Laboratory, he noted.

Glasstone has also been responsible for compiling and editing LASL's quarterly status reports on Weapons Research and Development, Medium Energy Physics, Rover, and Space Electric Power Research and Development Programs, and the annual status report on Controlled Thermonuclear Research.

He is currently collaborating with Les Redman, D-6 group leader, in revising a book on the principles of nuclear weapons which Glasstone originally wrote in 1954 and revised in 1962. This is the first and only report of its kind and is considered by Glasstone to be one of his most important contributions to the Laboratory.

Glasstone received the Worcester Reed Warner Metal in 1959 from the American Society of Mechanical Engineers for his outstanding contribution to the permanent literature of engineering through his writings on nuclear engineering. In 1968 he was the recipient of the American Nuclear Society's Arthur Holly Compton Award for his contributions to nuclear science and engineering education.

At Oak Ridge one of his first projects will be to revise "The Effects of Nuclear Weapons" for the AEC. He will also serve as a consultant to the director's office at ORNL.

"My association with the Los Alamos Scientific Laboratory has been an extremely pleasant one," Glasstone said. "My one regret is that I have to terminate this association and leave New Mexico. But life is full of compromises and this is one that must be made."

Producing Items of Plastic To Meet Specific Job Requirements

If it hadn't been for the billiard ball where would the American plastics industry be today? It's hard to tell. Something else might have catapulted plastics technology to its present state, but that isn't the way the history of American plastics unfolded.

Until the latter half of the 19th century, billiard balls were made of ivory. But the "great white hunter" in Africa was killing off the elephant population at an alarming rate and ivory was becoming a scarce commodity. In 1863 a New York billiard firm offered a prize of $10,000 for patent rights, to be awarded to the scientist who could produce a substitute for ivory.

A young and mechanically inclined printer by the name of John Wesley Hyatt entered the race and for five years he mixed different things together until he hit on the right combination and discovered celluloid, the first member of the American plastics family.

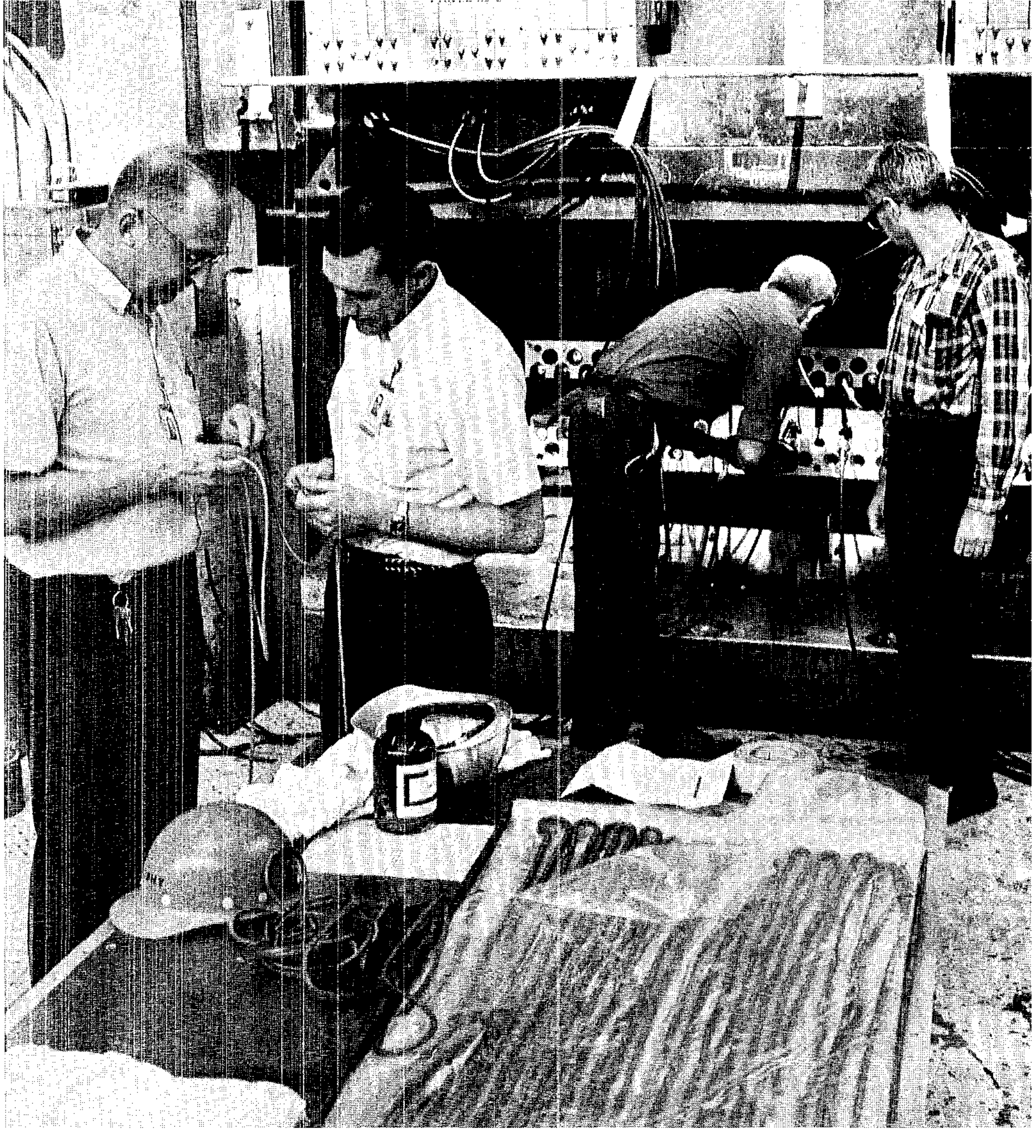
Today in their continuing effort to develop even better plastics and expand their already versatile role, scientists are still mixing things together, but with a better idea of where they are going and how to get there.

This is particularly true at the Los Alamos Scientific Laboratory where items of plastic are produced to meet specific job requirements across the entire spectrum of Laboratory activities.

This is the job of the Plastics Section. It is a part of CMB-6, the materials technology group, headed by James M. Taub. It employs 12 persons, including four staff members, who ply their profession under the leadership of Phil Ehart.

Ehart's section provides the Laboratory with those items that are of unusual design, size and composition. It does not try to meet all of the Laboratory's requirements for plastics. If a commercially-made item will meet a job requirement, it is generally purchased. For example, there are many commercially-made adhesives that will satisfy most requirements. Under a continuous program, approximately 30 different types have been evaluated by the section and are stocked in limited amounts. Two general-purpose adhesives have been recommended to the Supply and Property department for its stockroom. However, if none of these will meet a given job requirement, the Plastics Section will develop one.

In contrast, advancing technology at the Laboratory has required many O-rings that, because of size and composition, are not available on the open market. As a result, the Plastics Section has



Technician Roscoe Faussone and Plastics Section Leader Phil Ehart inspect 54-inch O-rings that were compression molded under heat and the pressure of the 5,000-ton double-action hydraulic press at CMB-6. At rear are Technicians Jerry Rowen and Wilmer Hughes.

made them in a wide range of sizes over the years which led to the compilation of a catalog of O-ring molds that are available to the Laboratory. Copies have been distributed to the various Laboratory sites. When a new mold is made, its description is added to the catalog by mailing out a page insert.

To carry out its work, the section employs some of the most talented personnel in the country's plastics industry. They are aided in the development of materials to meet specific job requirements by some of the most modern instrumentation available. Instruments known as the Differential Thermal Analyzer and Thermogravimetric Analyzer are used in combination to determine the characteristics of any materials that will decompose at temperatures between -200 and 1,200 degrees centigrade. These instruments are presently being used extensively in the development of better binder materials for reactor fuel elements.

Developing plastic materials that have special characteristics is common practice for members of the section. By combining materials, items can be produced that are either conductors or non-conductors of electricity, elastic or non-elastic, hard or flexible, permeable or non-permeable, soluble or insoluble, clear or pigmented, or that are resistant to unusually high or low temperatures, chemicals, weather, mechanical wear, stress and various types of radiation.

The variety of articles that are fabricated from plastics requires as much versatility in equipment as the men who use it. "We have equipment for essentially every process used by the plastics industry anywhere," Ehart said.

One of these processes is injection molding. A material softened by heat is forced into a cold mold under pressure. The article cools to the mold configuration and is ejected when the mold is opened. Another is compression molding in

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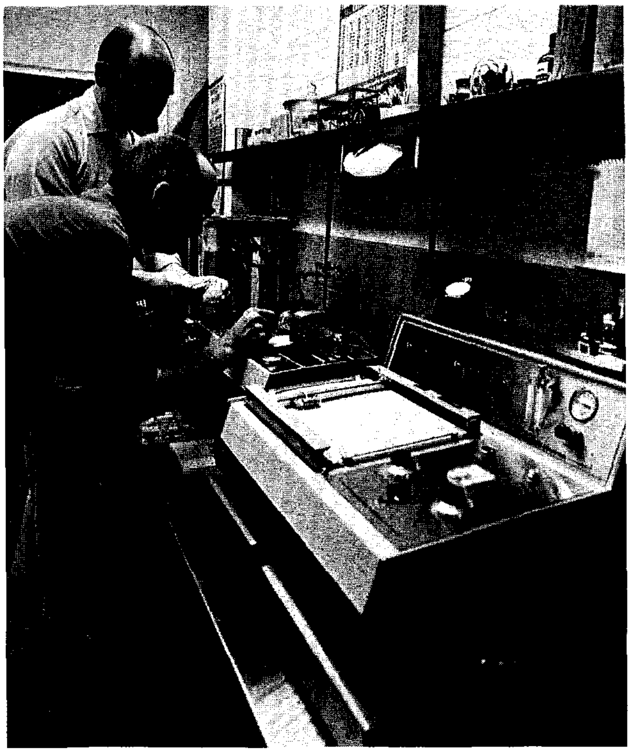
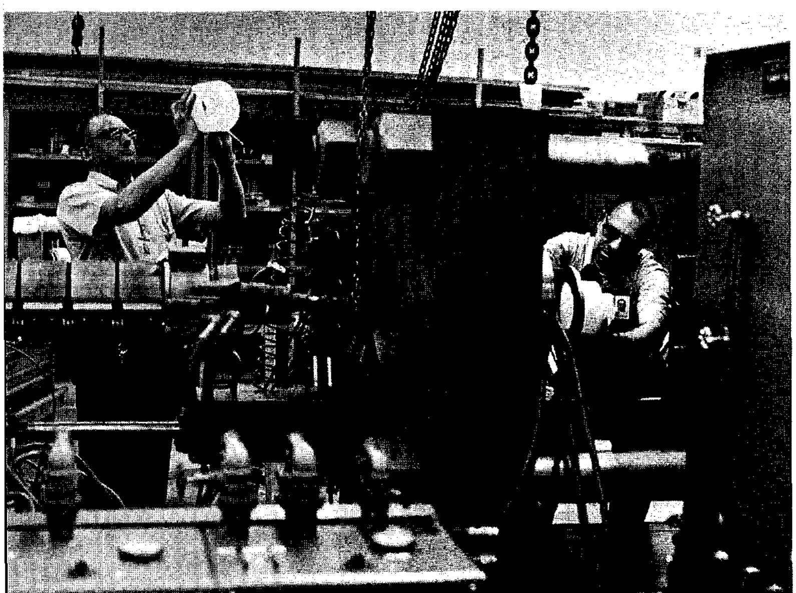


Staff Member Ed Eaton, rear, and Rowen place a sample in the Thermogravimetric Analyzer. In foreground is the Differential Thermal Analyzer. The two instruments are valuable aids in the development of materials to meet specific job requirements.

Technicians Faussone and Bob White work with the Plastics Section's largest injection molding machine to turn out cable cartridges for P division.



Producing Items . . .

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which a plastic material is forced to fill a hot mold by heat and pressure. An offshoot of this process is transfer molding in which a preheated material is inserted by a plunger into a mold cavity. It is employed when molding intricate parts, parts with delicate metal inserts or those with many apertures.

Other methods of fashioning an article of plastic are extrusion, vacuum forming, blow molding and casting. The first of these methods is one for which the Laboratory has a limited capability. It is the shaping of materials into continuous sheeting, film, tubes, rods, filaments and various other profiles. A molten plastic is forced through a shaped die at the end of a heating chamber. Vacuum forming is the shaping of an article from a sheet of heat-softened material which is drawn into a mold cavity by a vacuum. Blow molding is used to make hollow items. A two-sided mold is closed around a hot, semi-molten hollow tube. An air jet expands the tube to the configuration of the mold. Casting is the filling of an open-ended mold with softened or liquid material which hardens in the shape of the mold.

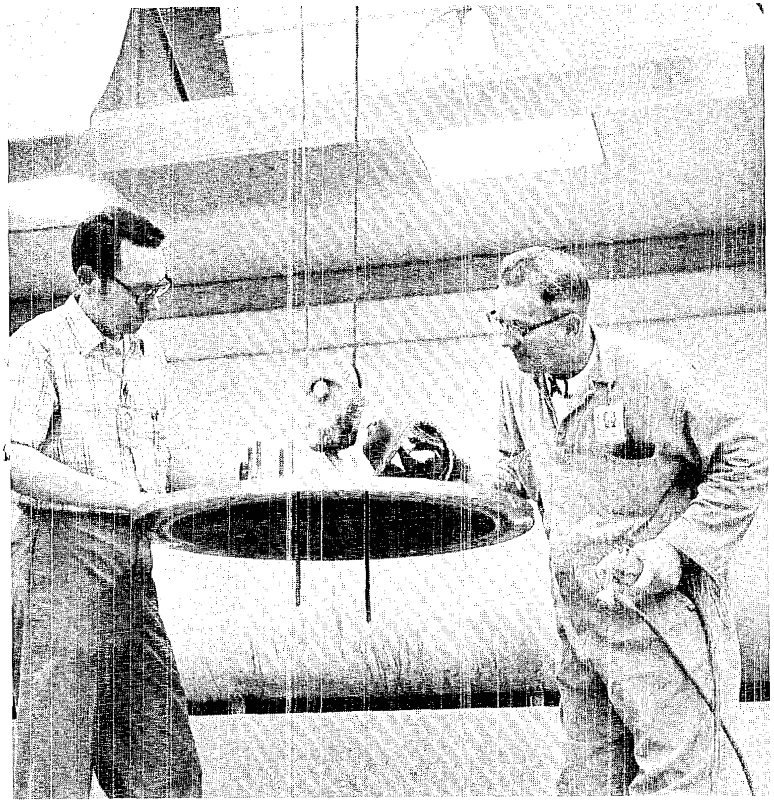
Sometimes an article must be imbedded within a plastic material. This is done by processes known as potting and encapsulation. Potting is the pouring of a material around an object. The object is usually placed in a container to give the potting material the desired shape. Encapsulation is similar to potting except the object has its own container.

In recent years there has been considerable interest in plastics foams. One of them, polystyrene, the same material used to make lightweight coolers for sportsmen, has been used extensively to make packaging for sensitive equipment such as N-division fuel elements and W-division weapon components. It is formed by steam-heating beads of the material which expand in the shape of the mold and fuse.

Another foam, polyurethane, is formed by a chemical reaction between two liquids. It can be poured around something—potting—and has also been used extensively to protect sensitive equipment, such as photomultiplier tubes, against shock and temperature.

A third type of foam, silicone rubber, is used almost exclusively for weapons component packaging.

Oftentimes, articles made by the section must



be joined, or broken parts brought to the Plastics Section by Laboratory personnel must be mended. The processes used are sealing, hot gas welding or adhesive bonding. Sealing is done with high frequency, dielectric or heat impulse equipment. Hot gas welding is used to join certain materials that cannot be sealed. Adhesive bonding is the joining of materials with a "glue."

Another capability of the section is the development and application of coatings. Many epoxy paints are under development and are being tested on the section's own equipment, including tool chests, cabinets and an overhead rail system in the section's main equipment room. A practical application is the coating of induction furnace coils and tubes to reduce corrosion or charring, increase heat reflection and minimize arcing.

One method of application is dip-casting, in which the object is dipped in a fluid material. Other methods are fluid bed—similar to dip cast-

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Staff Member Steve Newfield and Technician Jack McGurn spray-coat an item with an epoxy paint developed by the Plastics Section.

Technicians Hughes and Marvin Murphy inspect polystyrene-foam article that will be used to package sensitive equipment. In foreground is the mold that shaped it.

Producing Items . . .

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ing except the object is dipped in a powder whose particles are suspended in air; brushing; rolling; spraying and electrostatic spraying. The electrostatic application is a process in which each of the coating particles is electrically charged. One of the big advantages of this method is that the coating does not run thin on sharp edges.

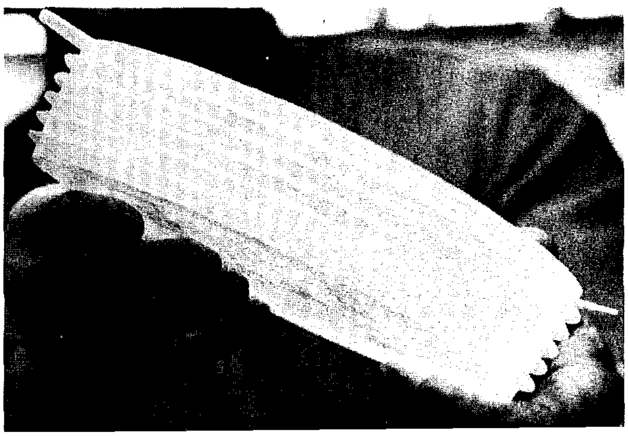
Articles and the molds that shape them are designed within the section. In addition to the complexity of many articles, design work must take into consideration the shrinkage they will undergo during the cooling process. By carefully calculating this shrinkage, the Plastics Section produces articles of closer tolerance than most commercial industries will attempt, said Pierre Hartshorne, assistant section leader.

One of the most recent and difficult molds to design and build was for a "stopper" used to plug arm ports of hot boxes when the boxes are not in use. The plug required a series of fins around its circumference. It could not have been made in a standard two-plate mold, consisting of two halves. The fins would have made it difficult, if not impossible, to separate the article from the mold. As a result, a mold with several parts that would cam away from the fins was designed. It and other molds designed by the Plastics Section are built by a branch shop operated by the LASL Shops department.

Sometimes a customer will be referred to another of the CMB-6 sections. Ehart and his associates know well the work other sections are able to do and will refer a customer to one of them if its capabilities are better suited for the job.

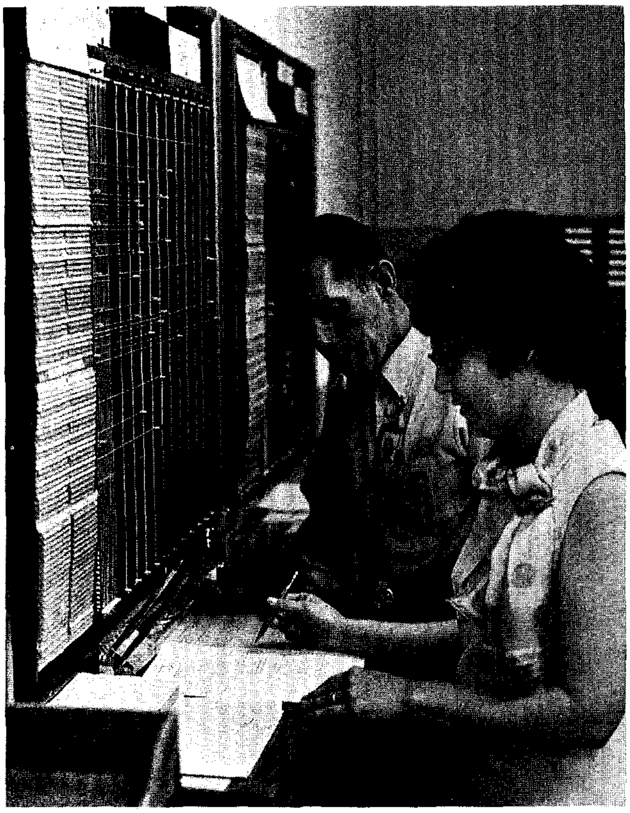
Oftentimes a job requires the joint participation of two or more sections. On one of these occasions, a customer needed a block of ceramic material from which a part could be machined. It is difficult, however, to machine sharp edges on

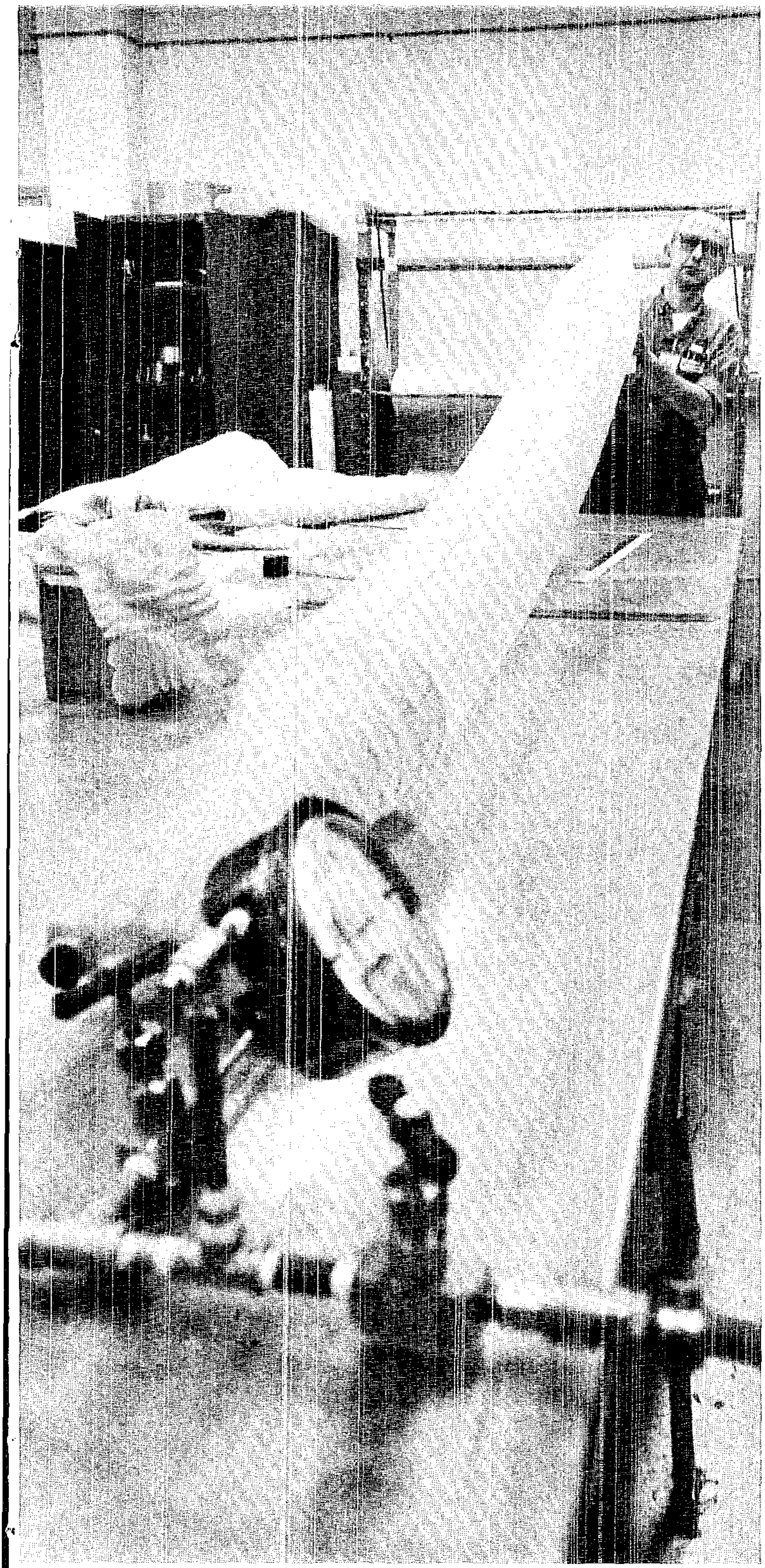
The fins on a plug for hot-box arm ports required a mold with several parts that would cam away from them.



Assistant Section Leader Pierre Hartshorne and Senior Designer Larry Ebaugh, on loan from SD-2, discuss the design of a film-can for J division. The can is required to be light- and water-tight and of a material that is anti-static and resistant to high temperatures.

Ehart and Secretary Pita Valencia update the section's control board which shows at a glance jobs in progress, their present status and due dates.





Rowen air-tests a gauntlet after the glove, foreground, was sealed to the sleeve by high frequency heating. The glove form was fashioned from Nambeware.

ceramic material because it has a tendency to chip. But, by adding a small amount of epoxy resin prepared by the Plastics Section, machining was possible. Subsequent firing of the part burned out the epoxy and fused the ceramic material.

The Plastics Section collaborated with Nambe Mills, Inc., in making a gauntlet used to cover mechanical manipulators in hot cells. A non-permeable metal form was needed to fashion the glove and the most suitable metal that could be found was Nambeware, used by the corporation in making giftware. Nambe Mills made the form to LASL specifications and by dip-casting, the glove was fashioned. After curing, it was stripped from the Nambeware form and sealed onto the gauntlet sleeve by high frequency heating.

In his office, Ehart maintains a "control board" which shows at a glance the number of jobs in progress, their status and due dates. The number of jobs in progress averages about 100. "We turn out about 40 a month, the majority of which require some development in either materials or processing," Ehart said.

These jobs vary in quantities that range from just a few articles to thousands. Because of this wide range and the combinations required, the section stocks more than 400 different types of materials ranging in amounts from a few ounces to several hundred pounds.

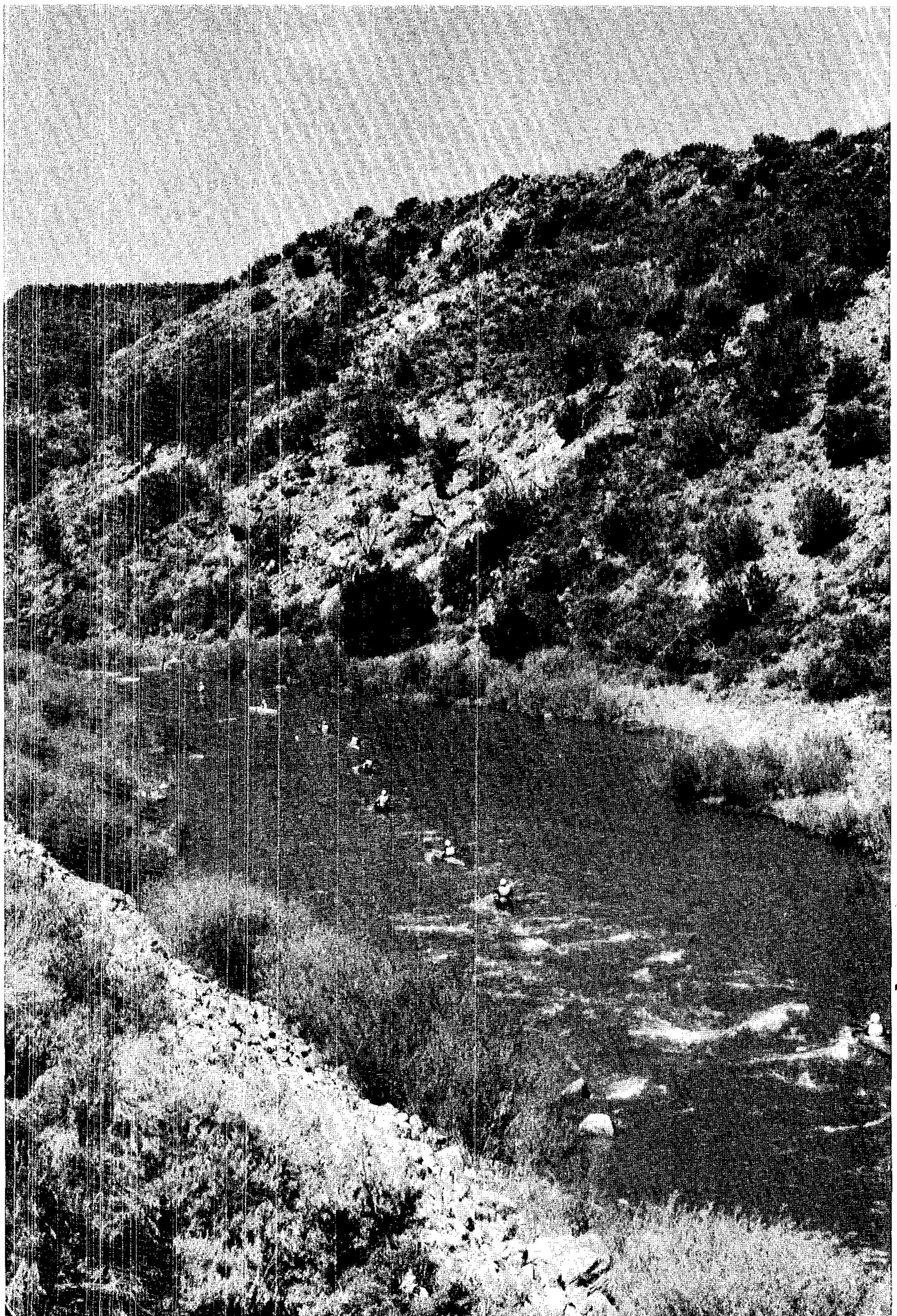
The section leader noted that LASL's Plastics Section has a more diverse capability than that of any other Atomic Energy Commission installation. By comparison, he said, other installations have either a more limited capability or they specialize in certain facets of the industry.

Some work is done for other AEC installations and, at regular meetings with their representatives and others from Great Britain, information is exchanged on new developments to assure there is no duplication of effort.

Another way in which section members keep abreast of new developments is through professional journals and other literature provided by member agencies of the plastics industry. A branch library is maintained, not only for section and group personnel, but for anyone at the Laboratory who needs information on plastics and associated processes. Library materials include the latest information on research and development of new plastics technology and equipment from other government and commercial agencies. Two of the major contributors are the U.S. Air Force Materials Laboratories and Stanford Research Institute.

The Year of the "Under 21"

A morning practice run acquainted the kayak team of the Colorado Academy of Denver with the hazards of the Rio Grande. Rules stipulate contestants must make at least one trial run prior to race.



Al Grubesic and son John, Santa Fe, look over a map of the race course. They were among an estimated 2,000 spectators.

Traditional domination of the Annual Rio Grande White Water Race by Los Alamos entrants was upheld last month as the Atomic City boaters took five of six awards. It was, however, the year of the "under 21."

For the first time in the race's history, persons under 21, with the consent of both parents, were allowed to enter. And both the rubber raft and the kayak titles fell to these youths.

Jerry Morton, son of William H. Morton, GMX-8, and Russell Sullivan, son of John H. Sullivan, CMF-4, paddled their rubber raft through the grueling 4.4-mile stretch of rapids, rocks and whirlpools in a time of 42 minutes and 55 seconds to top the list of 22 entries. Both will be seniors at Los Alamos High School next year.

Mary Lou Bolsterli, a teacher at the high school, and Hans Ruppel, T-9, were second in raft competition with a time of 45 minutes and six seconds, and a trio, made up Edward Norris, J-11, John Martin, P-DOR, and Walter Matuska, J-15, was third with 46 minutes and 27 seconds.

Roy Cromer, a graduate of Los Alamos High School who is a student at the University of New Mexico, narrowly won first place in kayak competition. Cromer, whose father is recent Lawrence Award Winner Don T. Cromer, CMF-5, beat 10 other entries in the division with a time of 23 minutes and 13 seconds. He finished the course 23 seconds ahead of Los Alamos High School senior Hugh Turner, son of Thomas Tur-

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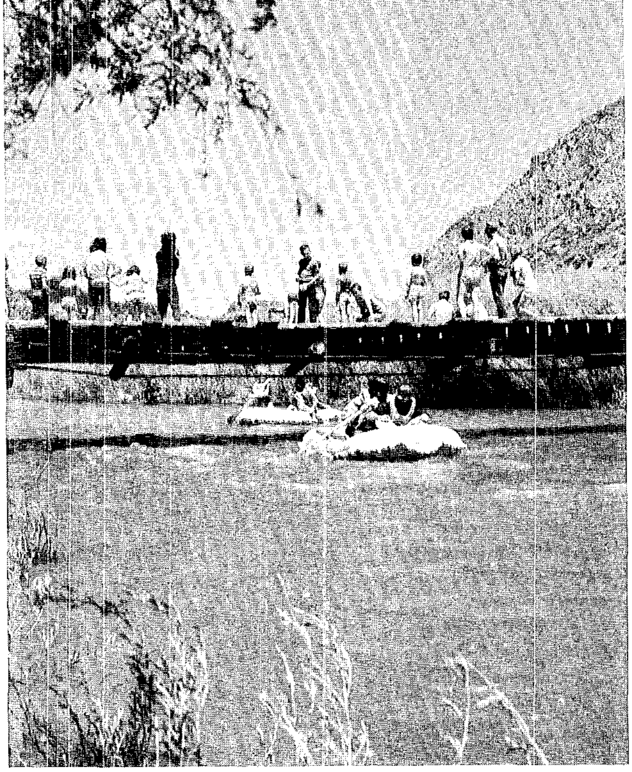
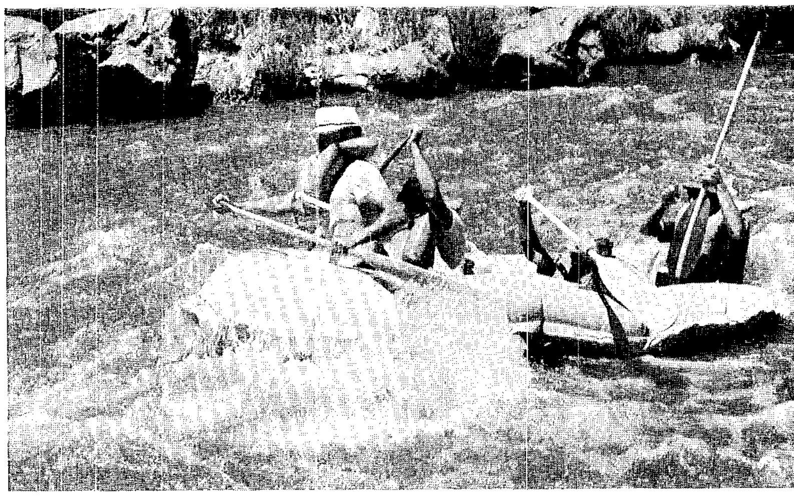
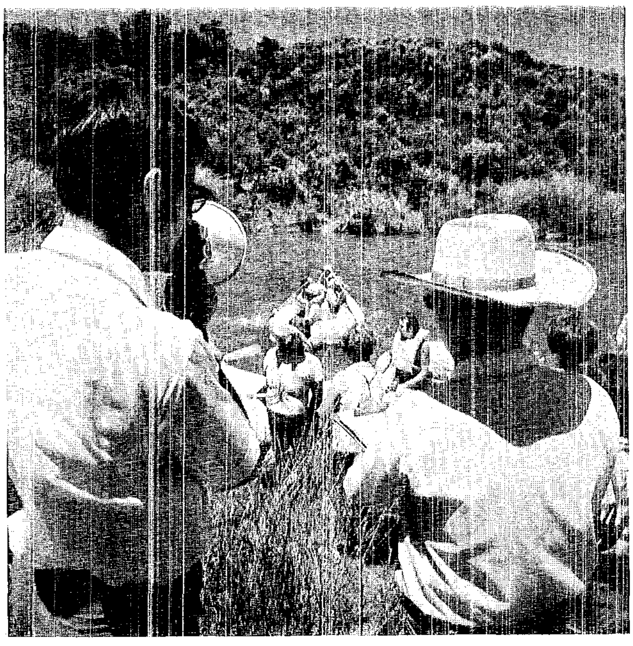


Ed Storms, CMB-3, with oars, and partner Martin Sullivan, a high school student, clear the low-hanging Glen Woody Bridge.



Many paddlers lost their balance as their river crafts twisted and turned in the rapids. The only one of a foursome from the Sandia Corporation maintaining his when this photo was taken is Mac Weaver, left. Others in the raft are Tim Taylor, Dave Overmier and Jim Linn.



Jim "Stretch" Fretwell, CMF-9, starts a rubber raft down the fast-running Rio Grande as Dick Glass, N-7, records the starting time.

. . . the Under 21

continued from preceding page

ner, MP-2. Frank Smith, another of the under-21 group from Colorado Academy of Denver, took third place in 31 minutes and 13 seconds.

Jim "Stretch" Fretwell, CMF-9, who originated the race 12 years ago said, "This was the best showing of boaters and spectators we've ever had."

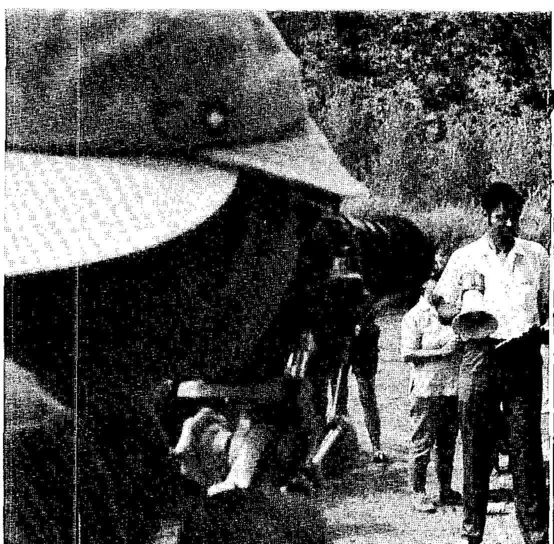
The boats shot the rapids beginning at a point near Pilar, New Mexico. The fast-water race took them beneath the low-swinging Glen Woody Bridge about mid-way in the course, past a new rapid formed by flash floods last summer, through the Big Rock Rapids where the river pinches down to a width of five feet; and through the Souschole Turn where the fast moving water makes a treacherous turn short of an irrigation diversion dam.

An estimated 2,000 spectators leap-frogged their way downstream on Highway 64 to watch the rafts and kayaks twist and turn through the white water.

Contestants were started at one-minute intervals in the race against the clock. Fretwell noted that record times are not established because wind, water level and swiftness of the river current varies from year to year.

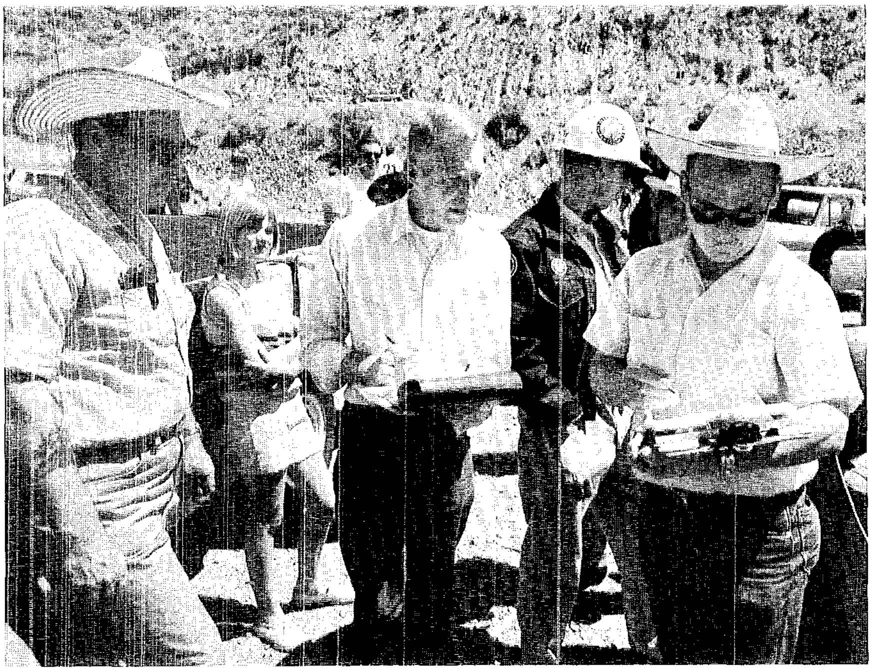
Two-way radio communication was provided by the Atomic City Citizens Band Radio Club, Inc. at strategic locations along the race route to help officials in timing and identifying the contestants. Those manning the mobile radio units were also prepared to help in locating and summoning aid for stranded and disabled participants. The Los Alamos Auxiliary Fire Brigade search and rescue vehicle was on hand in case of injury.

A full afternoon of racing completed, contestants and spectators await the tabulation of results at the finish line. It was located at the Taos-Rio Arriba County Line.



Left, Mrs. Jessie (Paul) Rudnick, T-DOT, and Mrs. Laura (Bob, P-DOR) Watt guide their raft through Big Rock Rapids.

Right, after capsizing, this Denver contestant succeeded in landing his kayak before it was drawn through Big Rock Rapids. He did not fare as well as his craft however, and crawled ashore some distance below the rapids.



Above, Charles Shampine, Los Alamos Fire Department, and Tom Gregory, GMX-1, members of the Atomic City Citizens Band Radio Club, check start and finish times with Glass. Wearing hard hat, at rear, is Wendell Smith, SD-5, also a member of the radio club. Left, Jerry Morton and Russell Sullivan, in front of banner, receive the plaque for winning first place in the raft division of the race. At left is Fretwell. With camera in foreground is Ken Chellis, MP-3.

short subjects

Gerold H. Tenney, technical advisor on nondestructive testing at the Laboratory, was elected vice president of the International Committee for Nondestructive Testing at a recent meeting in Freudenstadt, Germany.

Tenney, a charter member of the International Committee and its U.S. delegate, was also named to the organization's steering committee which is responsible for preparations for the Sixth International Conference on Nondestructive Testing to be held in Hanover, Germany in June of 1970.

Three inventions of Los Alamos Scientific Laboratory employees are among 83 for which patents have recently been made available to the public by the Atomic Energy Commission.

They are the Molten Salt Method of Separation of Americium from Plutonium by **L. J. Mullins** and **J. A. Leary,** both of CMB-11; Carbide Deposition on Tantalum by **J. C. McGuire,** Kennewick, Wash., and **C. Wohlberg,** formerly of K-2; Method for Inspecting Inaccessible Surfaces by **T. G. Gregory,** GMX-1.

Bengt G. Carlson, T-1 group leader, has been elected to the Board of Directors of the American Nuclear Society. He took office at the 15th Annual Meeting of the Society last month in Seattle, Wash.

The Board is the policy-making group of the 7,500-member Society. The ANS regularly sponsors meetings where research papers are presented and it publishes these and similar papers in its several journals.

Visitations at the Laboratory's Science Museum during the first five months of 1969 number 7,026 more than a year ago. During the first five months of last year, 18,375 visitations were recorded. During a comparable period this year there were 25,401.

Robert J. Van Gemert, Supply and Property department head, has been elected vice president of the National Association of Purchasing Management's District 2. The district consists of the six southwestern states of New Mexico, Texas, Oklahoma, Arkansas, Louisiana and Kansas.

Van Gemert was elected to the office for a one-year term at the Association's annual conference in Minneapolis, Minn.

His duties will be to represent the district on the Association's Executive Board and to be responsible for conducting conferences and workshops in his district.

Four Laboratory employees recently retired.

Virginia L. Johnson, counting technician with H-1, retired June 2 after more than 12 years with H division. She will make her home in Elk City, Kansas.

Mary D. Worman, P-6, also retired June 2 after 16 years with P division. She worked as a nuclear plate technician on a half-time basis. She will remain in Los Alamos where her husband, Fred, is employed by the Laboratory in H-DO.

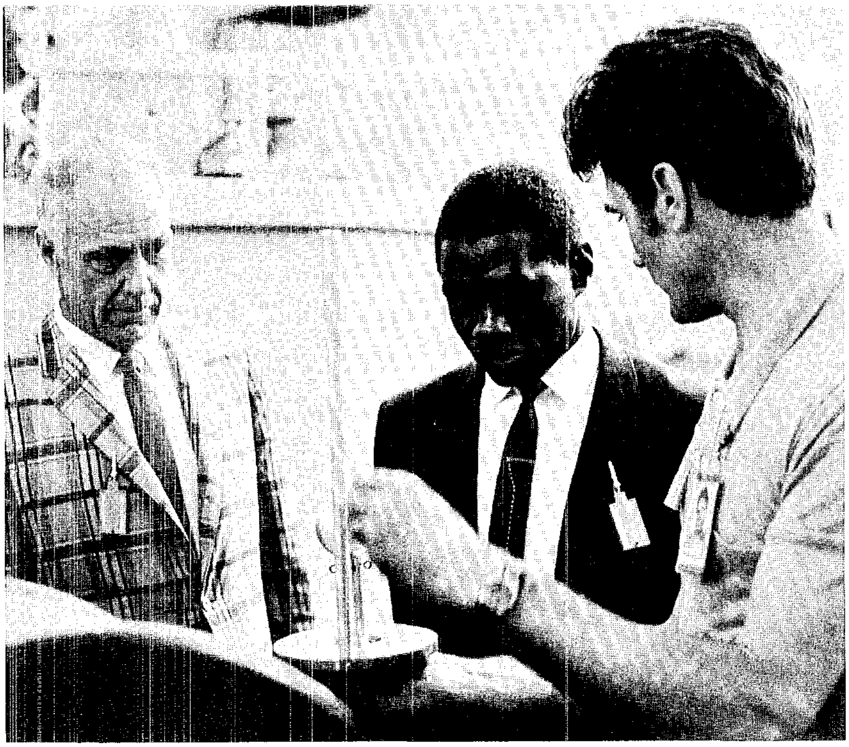
Louise Kohl, PER-2 group secretary, retired June 27 after having been with the Laboratory more than 10 years. She and her husband, Donald who is employed by MP-4, plan a trip to Europe this summer. They will continue to reside in Santa Fe.

Clayton Ross, staff member with K-3, retired May 28. He began work with the Laboratory in 1950 in CMR-10. He later transferred to DIRP-2, a special reactor project under the director's office and forerunner of K division. He became a member of K-2 in 1955 and, in 1957, transferred to K-3.

Richard F. Brenton, former N-7 assistant group leader who retired from the Laboratory in March, died in Salt Lake City April 21. He is survived by his wife, Leah, and four children, Nancy, James, Linda and Carol.

Services were held in the United Methodist Church in Los Alamos with interment in Guaje Pines Cemetery. Graveside Masonic rites were also conducted.

Touring some of the facilities at the Los Alamos Scientific Laboratory during a recent visit was Charles Katende, center, who is senior program assistant for the U.S. Information Service in Kampala, Africa. He was accompanied on the tour by John Brolley, P-DOR, left. At Omega site Bob Wenzel, P-2, describes a crystal of aluminum to Katende which is machined to a cylindrical shape and mounted on a pedestal. It is used to analyze the energy distribution of neutrons scattered from a sample under study to determine the energies of its lattice vibrations.



LAMPF Waveguide Accelerator Adaptation Used For Treatment of Cancerous Tumors

The waveguide accelerator, a remarkable system invented at the Los Alamos Scientific Laboratory for accelerating protons to greater energies than any other linear accelerator currently operating in the world, has made a significant impact on the medical field.

The accelerator, the heart of the Los Alamos Meson Physics Facility presently under construction, has been adopted by industry in making small accelerators that are within financial reach of many smaller hospitals and other medical facilities for the treatment of cancerous tumors.

The industrial version, known as the medical linear accelerator, utilizes a foot-long section of the waveguide accelerator. The first one was recently put to use at O'Connor Hospital, San Jose, Calif., and is an integral part of the recently completed Tumor Center. The device provides a razor-sharp radiation beam of four-million-electron-volt x rays. This allows complete radiation treatment of cancerous tumor areas without diffusing or scattering radiation to other areas of the body.

Dr. Walter G. Gunn, director of the O'Connor Tumor Center, describes the radiation treatment as a "selective, destructive effect," whereby cancer cells are destroyed while normal cells are relatively unharmed.

The wave guide system was designed by Darragh Nagle, alternate MP division leader, and Edward Knapp, assistant division leader. Knapp said the medical unit's compact size and lower cost make it distinctly advantageous over previous devices of this kind which to date have been so complex and expensive that their use has been limited to only the largest medical centers around the world. "This is an excellent example of how a pure research device such as an atom smasher can have practical applications, and in this case, even before completion."

The Technical Side

Presentation at American Physical Society Meeting, Philadelphia, March 24-27:

"Vibrational Relaxation in Shocked Chlorine with Added Carbon Monoxide and Hydrogen Chloride" by P. F. Bird and W. D. Breshears, both GMX-7

Presentations at Goddard High School, Roswell, March 27, and at Robertson High School, Las Vegas, N.M., April 9:

"Cryogenics and Cryogenic Engineering" by F. J. Edeskuty, CMF-9

Presentation at National American Chemical Society Meeting, Minneapolis, April 13-18:

"Nitrogen-15 NMH Studies of Hydrogen Bonding in Ammonia Systems" by W. M. Litchman, University of New Mexico, M. Alei, Jr., and A. E. Florin, both CMF-2

Presentation at symposium on Biochemical Events in the Cell Cycle, 53rd Annual Meeting of the Federation of American Societies for Experimental Biology, Atlantic City, April 13-18:

"Synchronously Dividing Mammalian Cells" by D. F. Petersen, R. A. Tobey and E. C. Anderson, all H-4 (invited)

Presentation at Sherwood Theory Meeting, Gatlinburg, Tenn., April 24-25:

"Ion Drift Wave Instability" by J. P. Freidberg and J. A. Wesson, both P-18

Presentation at Western States Student American Nuclear Society Conference, University of New Mexico, April 26:

"Solutions Seeking Problems" by R. E. Schreiber, TAD

Presentation at American Physical Society Meeting, Washington, D.C., April 28-May 1:

"Levels of ^{91}Y from the Decay of ^{91}Sr" by A. B. Tucker and J. E. Solecki, both Iowa State University, Ames, J. D. Knight and O. E. Johnson, both J-11

Presentation at the Annual Meeting of the American Ceramic Society, Washington, D.C., May 3-8:

"Nondestructive Testing, An Aid to the Ceramic Engineer" by G. H. Tenney, TANDT

"Present Status of the Uranium-Plutonium-Carbon Phase Diagram" by J. A. Leary, CMB-11 (invited)

"A Thermal Stress Crack Initiation Test Method for Ranking Ceramic Materials" by A. E. Carden, R. W. Andrae and R. F. Brenton, all N-7

Presentation at International Colloquium on Rare Earth Elements, French National Center for Scientific Research, Paris-Grenoble, France, May 5-10:

"Virtual Bound States in Plutonium: The Kondo Effect in Lanthanum-Plutonium and Praseodymium-Plutonium Alloys" by H. H. Hill and R. O. Elliott, both CMF-5

Presentation at TRIUMF Conference, University of British Columbia, Vancouver, Canada, May 5-6, and at seminar, University of Washington, Seattle, May 7:

"Construction Program and Research Plans for the Los Alamos Meson Facility" by D. E. Nagle, MP-DO

Presentation at Annual Meeting of the American Society for Microbiology, Miami Beach, May 5-9:

"Lysis and Filamentation of Haemophilus Influenzae After Ultraviolet Irradiation" by B. J. Barnhart, G. J. Kantor and S. H. Cox, all H-4

Presentation at American Foundrymen's Society Meeting, Cincinnati, May 5-9:

"Alloying Behavior of Thulium and Lutetium with Plutonium" by J. W. Anderson, D. R. Harbur and M. R. Conner, all CMB-11

Presentation at American Institute of Chemical Engineers meeting on Chemical Engineering Aspects of Nuclear Sodium Coolant Systems, Cleveland, May 6:

"Impurity Precipitation and Dissolution Rates in Sodium Plugging Indicators" by J. C. Biery and C. C. McPheeters, both K-3

Presentation at meeting of the student chapter of the American Institute of Aeronautics and Astronautics, University of Kansas, Lawrence, May 7:

"The Nuclear Rocket Propulsion System Program" by K. Boyer, J-DO (invited)

Presentation at Annual Meeting of the Aerospace Medical Association, the Fourth Harry G. Armstrong Lecture, San Francisco, May 7:

"Radiobiological Factors in Space Conquest" by W. H. Langham, H-4 (invited)

Presentation at Western Regional Meeting, Institute of Mathematical Statistics, Monterey, Calif., May 7-9:

"A Two Sample Test of Equality of Coefficients of Variation" by R. K. Lohrding, C-5

Presentation at 45th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science and the 40th Annual Meeting of the Colorado-Wyoming Academy of Science, Colorado Springs, May 7-10:

"The Phosphorus Content of Histones" by G. R. Shepherd, Billie J. Noland, and Carol N. Roberts, all H-4

"The Relative Stabilities of Rare Earth Sesquioxide Polymorphs" by G. C. Fitzgibbon and C. E. Holley, Jr. both CMF-2

Presentation at AIME Metallurgy of Chromium and Vanadium Symposium, Westinghouse Electric Corpora-

Ridge National Laboratory, Oak Ridge, Tenn., May 13-15:

"Tests of Sodium-Bonded Carbide Fuels—II" by R. H. Perkins, K-2

Presentation at Castings West Seminar, Long Beach, May 13-15:

"Advantages of Chill Casting Techniques to the Plutonium Foundryman" by D. R. Harbur, CMB-11

Presentation at seminars to undergraduate students and ANS section, May 15; and to graduate students and staff, May 14; Nuclear Engineering Department, Kansas State University, Manhattan:

"Instrumentation at the Los Alamos Critical Assemblies Laboratory" by H. H. Helmick, N-2

Presentation to Denver Chapter, Instrument Society of America, Denver, May 15:

"Escape from Siberia" by J. L. Tuck, P-DO

Presentation at University of New Mexico Physics Seminar, Albuquerque, May 16:

"Vela Satellite Observations of the Solar Wind Plasma" by M. D. Montgomery, P-4

Presentation at Boeing Scientific Research Laboratory, Seattle, May 19:

"Energy Resources of the Future with Emphasis on the Light Elements" and "General Economics and Pulsed Thermonuclear Reactors" by J. L. Tuck, P-DO

Presentation to Aerospace Department of Mechanical Engineering, University of Washington, Seattle, May 20:

"Energy Resources of the Future with Emphasis on the Light Elements" and "Scylla and Scyllac and Dynamic Stabilization and Report on the Recent Russian Tokamak Results" by J. L. Tuck, P-DO

Presentation at seminar to graduate class in plasma physics, Aeronautical and Astronautical Department, University of Washington, Seattle, May 20:

"Z-Pinches" by J. L. Tuck, P-DO

Presentation at Third International Cell Cycle Conference, Wrightsville Beach, N.C., May 19-20:

"Initiation of Biosynthetic Events in the Cell Cycle" by D. F. Petersen, R. A. Tobey, and E. C. Anderson, all H-4 (invited)

Presentation at meeting on the Technological Aspects of CTR, MIT, Cambridge, Mass., May 26:

"Effects of Gamma-Ray Heating Estimates on the LASL Pulsed-Reactor Model" by F. L. Ribe, P-15

Kenneth I. Thom, Santa Fe, ENG-1
Hugh D. Orr, Austin, Texas, ENG-2
William M. Coelho, Fremont, Calif., ENG-3

GMX division

Betty J. Bailey, Los Alamos, GMX-3

H division

Jose M. Bustos, Jr., Santa Fe, H-DO
Johnnie F. Harelson, Los Alamos, H-DO

J division

Norman H. Magee, Jr., Dover, Del., J-15

MP division

Dennis L. Roeder, Kenesaw, Nebr., MP-6

P division

Thomas G. Worlton, Idaho Falls, Idaho, P-2 (postdoctoral)

Personnel department

Helen T. Cruz, Los Alamos, PER-2
Samuel M. Serrano, Espanola, PER-4

Public Relations department

Eileen Janet Panowski, Los Alamos, PUB-2 (casual)

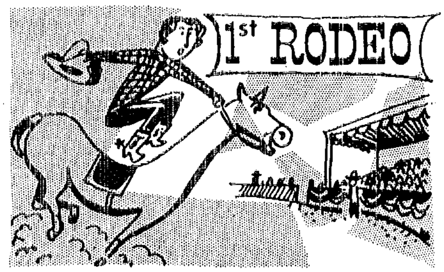
Supply and Property department

Chris R. Espinosa, Santa Cruz, SP-2
Janice K. Skalski, Los Alamos, SP-10
Judith A. Tolleson, Espanola, SP-10

W division

James J. Burns, Pittsburgh, Pa., W-1
James R. Miller, Farmington, W-1

20 years ago in los alamos



Culled from the July, 1949, files of the Los Alamos Skyliner by Robert Porton

Los Alamos Has Its First Rodeo

Bareback bronc riding, steer riding, goat roping, wild cow milking and a wild horse race are among the exciting events scheduled for the Hill's first rodeo to be held at Los Alamos Ranch July 16 and 17. Anyone may enter and compete for prizes. The entrance to the ranch is located on the road at the end of the golf course.

CMR Division Awarded Safety Plaque

A half million man hours of work without an injury is something to celebrate. The Los Alamos Scientific Laboratory honored the employees of CMR division yesterday with a special safety award party in appreciation of the establishment of the best accident-free safety record in the six year history of the project. Messages of congratulations were extended by principal speakers Norris E. Bradbury, Laboratory director, E. R. Jette, CMR-division leader and Roy Reider, head of the Laboratory's safety group.

AEC Awards Contract for Operation of Sandia

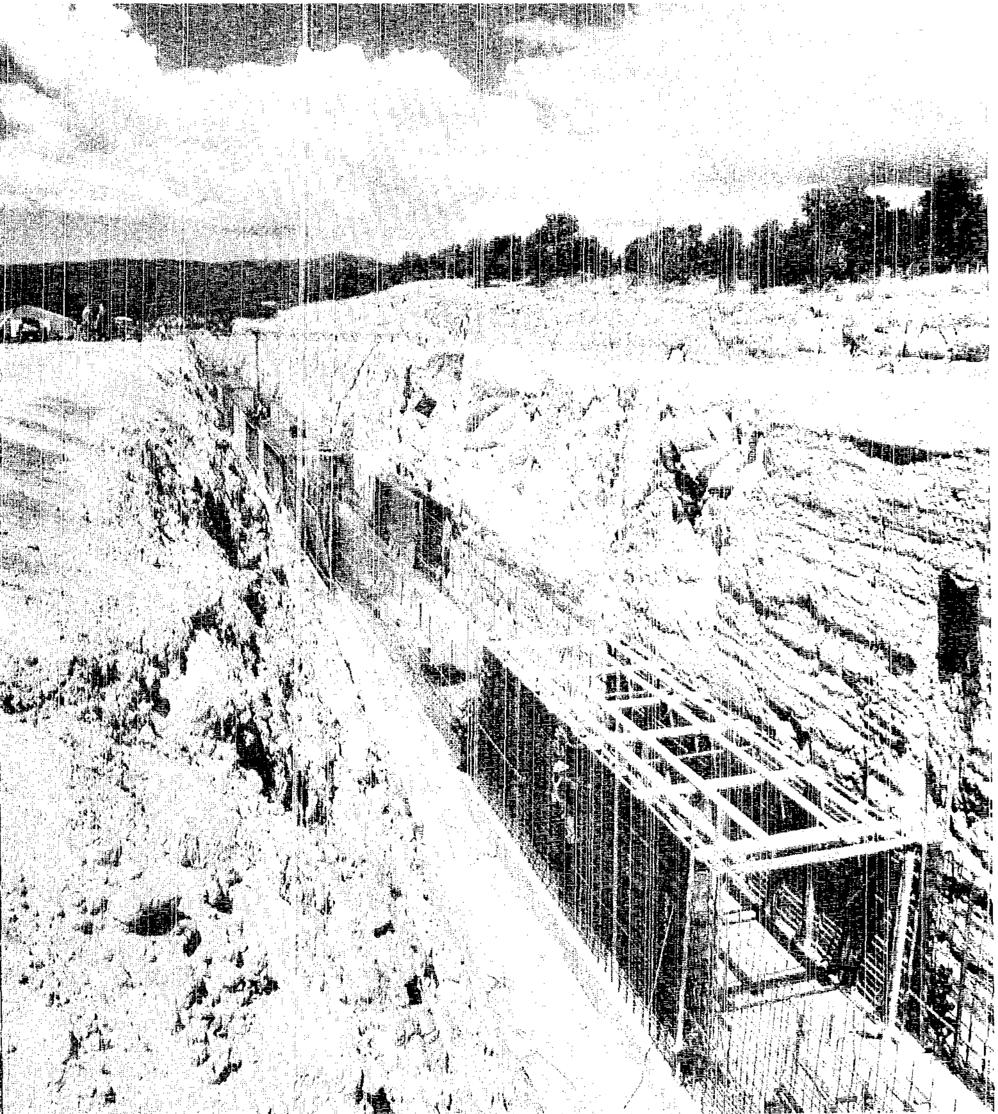
The Atomic Energy Commission announced this week that the services of the Western Electric Company and the Bell Telephone Laboratories have been obtained for the operation of the Sandia Laboratory in Albuquerque. Sandia has been operated since 1945 by the University of California under its contract for the operation of the Los Alamos Scientific Laboratory. The facility has grown, from a small liaison group representing Los Alamos, into a major activity. The University of California advised the Commission recently that it felt it could not continue the project. A special team of Western Electric, Bell and AEC officials met at Sandia today to prepare for the transfer of the contract.

Main Building of New High School Nears Completion

In the near future, one of the most modern and beautiful schools in the country will replace the present inadequate and unattractive Los Alamos High School building. The main building, located in the Western Area, is approaching completion. While the present high school enrollment is less than 200, its anticipated growth will make the new building a necessity.

Skyliner Suspends Publication

Because of conditions which make further publication impossible, the Skyliner management regretfully announces the suspension of operation today. With this, the final issue, the Atomic City loses its only local newspaper.



The walls of the Los Alamos Meson Physics Facility beam channel, which will house the waveguide accelerator, are taking shape. Above, forms for the walls are being built in sections. Below, concrete is transported on a conveyor belt over the channel excavation and then piped into the forms.

Henry T. Motz
3187 Woodland
Los Alamos, New Mexico 87544

From the old and scenic Espanola Wagon Bridge, a youngster dives into the Rio Grande River. The bridge was moved upstream from near Espanola long ago. It replaced a bridge built in 1881 that was washed away by flood waters a few years later. It links Embudo and the Jemez House Boys Ranch.